Aman Sah

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Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2022 - 2024	M.Tech in Aerospace Engg.	Indian Institute of Technology, Kanpur	7.0
2016-2020	B.Tech in Mechanical Engineering	Jadavpur University,Kolkata	7.31
2016	WBCHSE(XII)	Burnpur Boys' High School,Asansol	81.6
2014	WBBSE(X)	Burnpur Boys' High School,Asansol	88

Scholastic Achievements

- Academic Excellence awards from **Asansol Chamber of Commerce, International Association of Lions Club, Asansol Municipal Corporation** for **securing 1st position** in Secondary and Higher Secondary.

Research Experience

M.Tech Thesis Project

- **Scaling of High Thermal Intensity Porous Media RF Combustor** (*July'23- June'24*)
  Mentor: Prof. Vaibhav Arghode, Department of **Aerospace Engineering**
  - Developed and implemented a novel scaling methodology for a **6.25kW Reverse Flow combustor to 25kW**, achieving **MILD - CDC combustion** with **uniform heat release** rate and extremely low emissions **[CO] and [NOx]** through critical parameter **(velocity, residence time, jet decay, thermal-intensity etc.)** preservation.
  - CFD simulations in **ANSYS-Fluent** to optimize the placement of Co-axial Air-fuel inlet systems, facilitating sufficient **Product Gas-Recirculation and jet decay**, leading to excellent performance under lean operational range **Global Equivalence Ratio: 0.8 to 0.2** in the laboratory scaled combustor.
  - Investigated Various**SiC - Porous media**fills into RF - combustor, results show a substantial reduction in **[CO] and [NOx]** as compared to MILD-combustion.PMC also reduces operational **noise levels**.

Work Experience

Airshed India Pvt. Ltd.

- **Artificial Intelligence enabled Intelligent Traffic Monitoring System (ITS/ATMS) Software for Smart Cities** (*June'24- Ongoing*)
  - Developed and deployed a real-time traffic monitoring system using **YOLOv8 - DNN** and **OpenCV,OCR-pytesseract,tkinter(GUI)**, with custom-trained datasets of automobiles and image augmentation for precise **vehicle classification and speed detection**.
  - Implemented **ROI-based vehicle tracking** and integrated **CP-PLUS PoE camera with Raspberry Pi 4B** for efficient on-site processing, capturing **GPS** location, street ID, ROIs, vehicle count, and speed data.
  - Streamlined data collection and analytics by pushing data to **Airshed cloud servers**, enabling advanced **traffic analytics** and detailed report generation for improved traffic management and urban planning

Internships

Ineuron.ai(virtual)

Flight Fare Prediction using Machine Learning (*July - August '23*)

- Conducted **Exploratory Data Analysis(EDA)**, **feature extraction** on independent variables to enhance data quality and information representation.
- Assessed multicollinearity using **Variance Inflation Factor (VIF)** for the robustness of the predictive models to improve the feature importance.
- Achieved an impressive ***81.92% accuracy*** on test data post extensive **hyperparameter tuning** on **Decision Tree,Random Forest Regression, XGBRegression**.
- Successful model deployment using **Flask** framework on **Google Cloud Platform (GCP)**.

AIRSHED INDIA (Kanpur)

AI-Enabled River Cleaning Boat (*Dec'22 - cont.*)

- **DNN** for accurate detection and tracking of trash using **Stereo-Vision Camera**. Realtime Image Processing using **OpenCV -CSRT, Kalman, DeepSORT** trackers.
- Created and assembled detailed **3D models** of various components of the Autonomous Boat using **PTC-Creo**, employing advanced features and constraints for precise assembly.

Finlatics Business Analyst(virtual)

Strategic Business Expansion in the Indian IT Landscape (*June - July '23*)

- Conducted comprehensive Visual analysis of Indian market dynamics and growth potential, using **matplotlib, folium,geopandas** identifying key improvement areas and Provided **strategic investment recommendations** Using **Tableau and PowerBI** visualizations.
- targeted sectors, such as **BFSI, healthcare, retail, and entertainment** resulting in **informed decision-making** and targeted market entry.

Impact of Climatic Conditions on the Hotel Industry in India: Recommendations forInvestors (*June - July '23*)

- Generated data-driven insights to categorize states by climate, visualize hotel distribution, and estimate rainy days using **Pandas, Seaborn and Tableau, Power BI**. Offered actionable recommendations to potential hotel investors based on findings.

Academic Projects

Cracking Binary PUF Hardware Security Using Machine Learning (CS771)

Mentor: Prof. Purushottam Kar, Department of Computer Science & Engineering

- Research Project based on how the 1980s **2048 randomly** connected **PUF-CDU Hardware Encryption** can be cracked using **Linear Regression**.
- Out of Millions of Combinations our model can crack it within **0.3 seconds**using **minibatch gradient descent, NAG acceleration, and ISTA** to enhance the accuracy of input prediction.

Hexadecimal Image Parity Classification (CS771)

Mentor: Prof. Purushottam Kar, Department of Computer Science & Engineering

- Using **ResNet-18**, a powerful **CNN** architecture, to tackle the challenge of classifying the parity of **hexadecimal numbers** in **CAPTCHA** images. By leveraging ResNet-18's deep **hierarchical feature extraction** capabilities, achieved **99% accurate** predictions through the analysis of rotated, color-varied characters.

Thickness Optimization of Thermal Protection System for Re-entry vehicles (AE608A)

Mentor: Prof. Rakesh Kumar Mathpal, Department of Aerospace Science & Engineering

- Designed code for the optimal thickness of Thermal Protection System **(TPS)** of a re-entry vehicle subjected to time-dependent high-intensity load**(10MW/m2)** at localized regions of **re-entry** vehicles, using **Numerical discretization, Numerical stability techniques**.

Numerical Analysis of Unsteady Couette Flow with a Pressure Gradient (AE661A)

Mentor: Prof. Rajesh Ranjan, Department of Aerospace Science & Engineering

- A **numerical approach** to study the flow physics for **in-compressible Couette flow**,using the **finite difference method**
- A comparative study between **explicit(FTCS)** and **implicit methods(Thomas algorithm to solve tri- Diagonal Matrix)** of the solution was done along with variation of **Pressure gradient** and **Reynolds number**.

Projects

Blender Custom Way Point Navigation using LiDAR Data | SOARON Ind.

- Developed Algorithm for Precise Waypoint Navigation for 3D Models using the **LiDAR data.**
- Extensive **data visualization**, Creating **Research backed Decision Making simulation**,for Waypoint Navigation using **Blender python scripting**

Packaging Material Classification Web - Application)

- **DNN** for accurate classification of packaging material using the **Text(s),Bar-code(s),Company-Logo(s),Images of Object(s)** present on the packaging material.
- Using the power of **CNN-DarkNet(YOLO-V5),Tesseract(OCR),Pyz-Bar**. Acceptance check achieved using Image Processing **Open-CV** .
- Real-time Web Application on **Streamlit** for **User Interface** to show results after post-processing.

Predictive Maintenance of Jet-Engine Using Machine Learning

- Developed and implemented a Machine Learning model to forecast the **Remaining Useful Life (RUL)** of jet engines, data gathered from **C-MAPSS** software for various engines and runtime.
- Incorporating **Multiple Linear Regression, Decision Tree Regressor, Random Forest Regression** Achieved a remarkable **R2 score** of **0.723** on the validation set.

Relevant Courses and Certifications

Academic Courses

Linear Algebra and Differential Equations (AE602)	Applied Numerical Methods (ME685)
Heat Transfer in Aerospace Application (AE608)	Applied CFD (AE661)
Turbulence (AE664)	Introduction to Machine Learning (CS771)
Combustion	

Udemy Courses

Python for Machine Learning And Data Science	SQL-MySQL for Data Analytics and Business Analysis
Data Structure and Algorithms	Tensorflow 2.0: Deep Learning and AI
QuantConnect for Finance and Algorithm	Simulation using Ansys Fluent

Coursera Courses

The Power of Statistics	Introduction to Computer Vision and Image Processing
Translate Data into Insight	Ask Questions to make Data Driven Decision
Data Science and Visualizations	Detecting COVID-19 with Chest X-RAY using PyTorch
Google Analytics for Beginners	Advance Google Analytics

Technical Skills

- **Programming Languages:** Python, MATLAB, SQL-MySQL,Git, LaTeX
- **Software** Creo Parametric, ANSYS (Fluent, Static structural), AutoCAD, SOLIDWORKS, MATLAB-Simulink, Blender,Docker, Tableau, PowerBI, MS Office
- **Libraries:** Pytorch, keras, Tensorflow-tflite,YOLO, Numpy,Pandas,matplotlib, QuantConnect, PyGUI-tkinter, Seaborn, OpenCV, geopandas, PyZbar,Tesseract,folium,byte-track,bot-SORT,DeepSORT(tracking) Streamlit-webapp.

Position Of Responsibility

- **Teacher and Mentor, PRAYAS-IITK** (*2022-Present*)
  - Currently teaching and mentoring **12** needy students for their Academic journey.
- **Teaching Assistant, AE401A and TA111** (*Aug - Cont.*)
  - Assisting prof.Vaibhav Arghode for smooth ongoing coursework.
  - Assignment evaluation and suggesting feedback for better technical information sharing.
- **Student Guide, Counselling Service Team** (*2023-Present*)
  - Guided and mentored **20+ freshmen** students in acclimatizing to the Environment of the Institute.

Extra-Curricular Activities

- Represented Dayanand Vidyalaya(Asansol) in **SRM Mission Innovation** Tech fest,competing with **30+ other district level** Schools and colleges.